JOURNAL

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A. S. T. E. Journal

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EDITED BY THE PUBLICITY COMMITTEE

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Don W. Patterson
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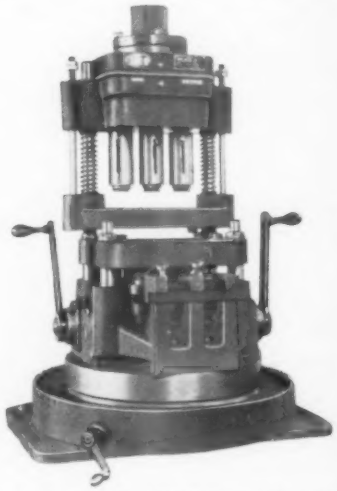
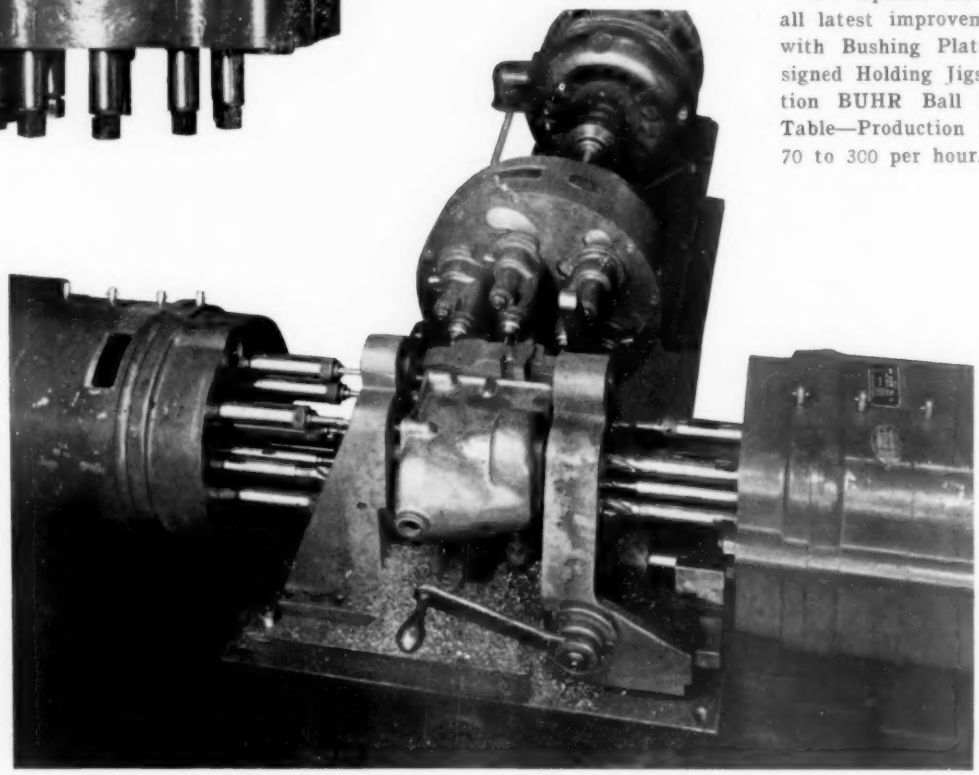
O. W. Winter
W. J. Watson

Address all communication relative to editorial matter and copy to Publicity Committee, 8316 Woodward Ave., Telephone: Madison 5048.

Left shows a 12 Spindle BUHR Ball Bearing Tapper Head, together with BUHR Reverse Unit. Spindles having BUHR Micro-Lock Vertical Adjustment and BUHR Floating Tap-Holders. This Head is used in tapping 12—7/16—14 holes in a Banjo Housing. Production greatly increased over former method.



A 3 Spindle BUHR Head with all latest improvements, together with Bushing Plate. BUHR designed Holding Jigs and a 2 position BUHR Ball Bearing Index Table—Production increased from 70 to 300 per hour.



A recent tooling of a well-known Automobile transmission, consisting of a 10 and a 7 Spindle BUHR Ball Bearing Drill Head mounted on opposite sides and a 6 Spindle BUHR fully Adjustable Head mounted in the rear on a 3 way Hydraulic Feed Machine. A quick operating Jig designed by BUHR Engineers is part of the equipment.

Twenty years of experience are at your service.
When it is a drilling or tapping problem,
Buhr Engineers are able to solve it for you.

Buhr Machine Tool Company

ANN ARBOR, MICHIGAN

Detroit Office **2832 E. Grand Blvd.** **Tel. Trinity 2-3686**

SOCIETY ANNOUNCEMENTS

The 1933 dues of $3.00 are now due and payable to Mr. A. M. Sargent, Secretary, AMERICAN SOCIETY OF TOOL ENGINEERS, 8316 Woodward Avenue, Detroit, Michigan.

NOMINATING COMMITTEE

According to the Constitution and By-Laws of the AMERICAN SOCIETY OF TOOL ENGINEERS, a Nominating Committee must be elected at the February 9 general meeting, at the Detroit Leland Hotel. We quote the Constitution and By-Laws below:

Constitution

Nominating Committee

"The Annual Nominating Committee of the Society shall consist of not less than five (5) members. Each Chapter of the Society to be represented by at least one member, but not more than two (2) memebrs, to be elected at or before the February Membership Meeting. Three members to be elected at the General Membership Meeting held on the second Thursday of February of each year. Preferably no two (2) of said three (3) members shall be members of the same Chapter or reside in the same district or be employed by the same Company.

"Twenty (20) or more members entitled to vote may constitute themselves a *'special nominating committee'* with the same power as the Annual Nominating Committee."

By-Laws

"The Nominating Committee shall organize promptly following its appointment, and shall forward to the Secretary, on or before March 1st, the names of consenting nominees for the elective offices next falling vacant under the Constitution. The report of the committee shall be printed in the March issue of the ASTE Journal.

"A Special Nominating Committee, if organized, shall, on or before March 1st, present to the Secretary the names of the candidates nominated by it for the elective offices next falling vacant under the Constitution, together with the written consent of each. The report of the Committee shall be printed in the March issue of the ASTE Journal."

It shall be the duty of the Nominating Committee to nominate candidates for President, First and Second Vice President, Secretary, and Treasurer of the Society for the coming year, beginning May 1.

The candidates selected by the Nominating Committee are to be announced at the February 9th meeting. The Committee must obtain the consent of the member being nominated.

The officers are elected by the Board of Directors in regular session, and they may or may not adhere strictly to the list nominated by the Nominating Committee.

The Board of Directors consists of 33 members, 28 of which are nominated and elected in the fall by the membership at large. The 5 officers of the preceding year automatically become directors, completing the 33 member board.

At the January 19th meeting of the Board of Directors President J. A. Siegel appointed a special Application Committee to solicit those members who have not made out and sent in their application blanks. This committee consists of "Bill" Smila, Chairman; "Al" Sargent; "Bill" Fors; Ray Farmer; and "Joe" Siegel.

It is necessary that the Secretary's office have the formal application of each member for purposes of classification and completing the records, and you members who have not sent in the application had better do so at once or the committee will call on you.

MEMBERS—ATTENTION

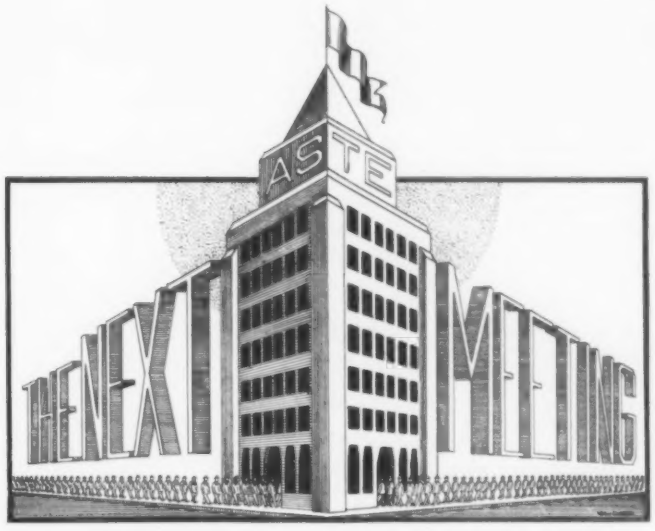
A few words about the publication of your Journal. Beginning with the first issue of the JOURNAL of THE AMERICAN SOCIETY OF TOOL ENGINERS shortly after the Society started, in 1932, all work in connection with producing the Journal has been done by the members of the Publicity Committee, with the Secretary's office taking care of distribution. Costs of printing, art work, stenographic work, envelopes, and postage are covered by the advertising which appears in the Journal.

Several suppliers of tools and equipment have been using our pages as a medium for telling you of their particular products, and their support has made it possible for us to continue producing the Journal. Each Journal costs approximately 28c. You receive twelve issues per year at a cost of about $3.36. You pay $3.00 per year dues which covers the Society administration and meeting's cost only. It does not require an Einstein to figure how far the Journal would get without our advertisers.

Perhaps the hardest part of the Publicity Committee's work in producing the Journal is in soliciting and securing the advertising, and each member of this Society should be conscious of the work they are doing and should also be conscious of every advertisement appearing in the Journal. In specifying products advertised in the Journal mention the fact that you saw it advertised in the Journal. We believe that a proper attitude by all members towards our advertising patrons will materially lessen the work of the Publicity Committee, and to aid you we are inserting a list of our advertisers in this issue of the Journal. This list is made in convenient form for placing under the glass on your desk or for filing in a convenient place.

Yours for a better and larger Journal.
THE PUBLICITY COMMITTEE

Thursday,
February 9, 1933,
at
Detroit Leland Hotel,
Main Ball Room,
8 P. M.



Election of Nominating Committee.

Speaker:

Mr. Vickers.

Subject:

"Hydraulic Feed System Suitable for Constant Volume Pumps."

Mr. Vickers of VICKERS INCORPORATED, Detroit, Michigan, will be the speaker at the February meeting of the AMERICAN SOCIETY OF TOOL ENGINEERS. His talk will deal with the development on design and construction of a hydraulic feed system suitable for constant volume pumps. There will be some curves and design data which apply to hydraulic systems in general. The talk will be illustrated by a number of slides showing diagrams, cross sections, and external views of complete units, as well as complete machines equipped with these units.

NEWS NOTES OF THE INDUSTRY

Now that the New York Automobile Show has come and gone, post mortems are going the rounds. How was the attendance? Which exhibits were the hits of the show? and other questions are being asked.

As for the attendance, although no actual figures are given out, is generally believed that the "gate" was an exceptional one considering present economic conditions. *The New York Times* is quoted as reporting that the attendance for Friday evening, January 13, was the greatest single evening's attendance in the history of the New York Show.

As for the so-called "hits of the show," Chris Sinsabaugh, in *Automotive Daily News*, sums it up thus, "Looking back on the show itself, there are several displays that have left an impression on me. Pierce-Arrow's Silvery Flash, the streamlined $10,000 sport job, undoubtedly was one of the high spots of the show. It was always surrounded by big crowds. Rockne, with its golden key scheme, "packed 'em in," and the idea was one of the most original ever sprung at an automobile show. Hupmobile gave us something original too in the way of a booth display. The car, of course, was stationary, but the background moved, giving the idea of the Hupmobile skimming along a country road. Chrysler's cream theme (all the cars cream colored and the attendants in cream-colored clothing) caught the public fancy."

New passenger car sales in 1932 totaled 1,097,716 units, according to an estimate announced by R. L. Polk & Company, compilers of official registration statistics. The estimate was founded on complete returns for eleven months and estimated figures for December, 1932. The 1932 total is the lowest in the last decade.

Now that alloy cast-iron camshafts have proved highly successful in production cars and crankshafts of similar materials have proved equally successful in experimental engines, it will not be surprising if the Ford Motor Company applies them in one or more of the production engines in the new lines expected to be announced late in January.

R. G. Dun and Company, New York, has just completed a survey of the automotive industry and concludes that the vehicle business for 1933 should run somewhat ahead of the levels in 1932. The report holds that sales for the next two months should hold equal to the same two months of last year, and that, with the opening of the normal spring buying season, the volume should increase over that of 1932.

Decline in consumption of motor fuels in 1932 was not as great as the oil industry had feared, it is indicated by figures compiled by the statistician of the American Petroleum Institute. The total decline amounted to about 9.2 per cent as compared with the 1931 figure, and the domestic consumption was off 7.8 per cent.

EDITORIAL PAGE

The present officers and directors of your Society were elected from a membership of less than one hundred. The membership has increased by several hundred since that time.

It is the duty of the members to elect a nominating committee at the next regular meeting which will be held February 9th. The nominating committee is to nominate officers to serve for the next year, beginning in April. One of the officers to be nominated—the president—must be a member of the present board of directors. The others *may* be directors but need not be. The names of the nominees are to be announced before the meeting is adjourned.

Since the nominations are to be announced at this meeting, and no nomination can be made without the nominee's consent, all prospective officers should be present. If it is not possible for a nominee to be present at the meeting, his written consent should be obtained before the meeting by the one wishing to nominate him.

The officers to be nominated are a President, two Vice-Presidents, a Secretary, a Meetings Chairman, and a Treasurer.

The board of directors elects the officers. The board has the power to elect officers other than those nominated, if in its judgment the welfare of the Society is better preserved or further advanced by so doing.

We have no precedent upon which to base a prediction, yet it would seem likely the directors will follow the recommendations of the nominating committee. If they do not, and their action is unpopular, then at the time the members elect a new board of directors . . . . . it may indeed be a **NEW** board of directors.

To a very great extent the future of your Society depends upon what officers you nominate to guide it in its youth. We need men of courage, vision, and ability not only in matters pertaining to tool engineering, but also in matters pertaining to general business. These men must be of sufficiently large calibre to inspire the utmost confidence of the manufacturing industry and other engineering societies. They must be men who are known and respected, not just in Detroit or Michigan, but throughout the entire industry. We have such men in our Society.

If you believe the present officers are of this calibre — retain them. If you believe others are better fitted — nominate them. But by all means give this matter your most serious consideration. Think the situation over and talk it over, then come to the meeting prepared to make your nominations. And for the good of the Society . . . . . may the best men win!

DO YOUR DUTY!

ANNOUNCEMENTS

We are reproducing below a copy of a letter sent to the AMERICAN SOCIETY OF TOOL ENGINEERS by the LANSING ENGINEER'S CLUB. This announcement should be of interest to ASTE members.

THE LANSING ENGINEER'S CLUB
LANSING, MICHIGAN

November 26, 1932

A. M. Sargent, Sec'y.,
American Society of Tool-Makers,
8316 Woodward Avenue,
Detroit, Michigan.

Dear Mr. Sargent:

Last Monday evening, November 21st, the State Board of Directors of the Michigan Engineering Society met with the Convention Comittee of the Lansing Engineering Club for the purpose of outlining plans for the next Michigan Engineering Society State Convention, which was definitely decided that it would be held February 9th and 10th, 1933 at Lansing.

Preliminary plans are being rapidly formulated for a real convention for which it is the hope of our city to attract a large attendance.

In the face of present conditions, we are not overlooking the item of economy and are endeavoring to arrange the entire program in a fashion that will be of maximum benefit to all at a minimum cost.

We are endeavoring to obtain speakers of the highest quality to deliver subjects of greatest value to the Engineering profession. Considerable effort is being expended in arranging a valuable meeting on the subject of the Reconstruction Finance Corporation as a means of aiding a trade recovery. This subject should be extremely interesting to every engineer as it has the essential possibility of creating a considerable amount of municipal work of certain kinds from which a number of engineers receive their livelihood.

You can be a great assistance to us in making our convention a success by announcing the dates of our meeting at the next regular meeting of your society and through circulating announcements to your membership.

Trusting you will cooperate with us in this endeavor, I remain,

Yours very truly,
(Sgd.) W. R. Carlyon.

Mr. Clarence J. Erickson, member of the Publicity Committee, is the proud papa of a seven pound baby daughter, Rima Musette, born Tuesday, January 17.

The VULCAN ENGINEERING CORPORATION, Jackson, Michigan, have appointed HABERKORN & WOOD, 2208 West Fort Street, Detroit, Michigan, their exclusive sales representatives in Michigan territory on Corwin Drill and Tap Units and Vulcan Tube Cut-Off Machines.

DETROIT A.S.S.T CHAPTER

Steel Treating Lecture Course

A practical course devoted to Heat Treating and its Problems. The entire cost of this program will be borne by The Detroit Chapter of the American Society for Steel Treating and will be open to all who are interested.

PROGRAM

Monday, February 6, 1933
The Raw Materials of the Heat Treater
Types of steels, their condition and properties as they reach the heat treater
J. M. Watson, metallurgist, Hupp Motor Car Corp.

Monday, February 20, 1933
Forging
The hot working of steel before heat treatment
Grover Eads, Supt. of Dodge Bros. Forge Plant, in conjunction with
Messrs. Hellebush and Hyslop

Monday, March 6, 1933
Heat Treatment
Necessity for heat treatment and the methods and materials used in the modern plant to obtain the required results
Messrs. Stilwill and Weber, Cadillac Motor Co.

Monday, March 20, 1933
Case Hardening
Fundamentals of the carburizing process and the treatments which follow
H. W. McQuaid, Metallurgist, Timken-Detroit Axle Co.

Monday, April 3, 1933
Equipment Problems
Furnaces, pyrometer and other control equipment, quenching and cooling systems, conveying and handling equipment
Floyd Harris, Furnace Engineer, Buick Motor Co.

Monday, April 17, 1933
Physical Tests and Their Interpretation
The equipment and methods used in testing heat treated work
F. E. McCleary, Metallurgist, Dodge Bros., Division of Chrysler Corp.

The speakers have been selected because of their experience with your problems and their ability to present the subject in a clear manner.

DETROIT CITY COLLEGE
Cass and Warren Avenues
7:30 P. M.
No Charge—FREE to All Interested

LAST MEETING

The regular monthly meeting held January 12th at the Detroit Leland Hotel was preceded by a dinner at which Fred Hoffman and his number 2 crew, consisting of Walter F. Wagner, Kenneth C. Snell, William C. Maier, and O. B. Jones, were honored guests. They were dined by the Society as a reward for bringing in the most members during the membership drive which ended December 31st. One member of this fast team, O. B. Jones, was unable to attend the meeting and accordingly lost out on the dinner. He says he will take the dollar instead. (Editor laughs here.)

The winning team turned in 35 applications, and second place was won by William Peterson's team, number 10, with 17 applications. They paid for their dinner. You have to be good to get something for nothing.

"How I do It"

Mr. F. L. Hoffman passing out applications.

Mr. Hoffman explained how easy it was to get members. He lays an application on a prospect's desk, and in a short time the prospect makes an inquiry, and he gets the application and filing fee.

Secretary Sargent summarized the spread of our membership in his report of the distribution of the January Journal. 694 Journals were sent out as follows:

Detroit (Metropolitan)	478	Indiana	8
Pontiac	20	Washington, D.C.	1
State of Michigan (Miscellaneous)	79	California	4
New York State	15	Connecticut	7
Illinois	16	Ohio	14
New Jersey	17	Rhode Island	1
Pennsylvania	16	Canada	2
Wisconsin	5	Sweden	1
Massachusetts	1	France	3
Iowa	1	Brazil	1
Maryland	2	Australia	2

Some sections are increasing membership to the extent that several Chapters may be formed during 1933. Twenty-five or more members in a section may apply for Chapter privileges.

Before the meeting proper "Bob" Lippard (Heald Machine Company) conducted a song-fest, and competition developed between the North and South side of the main dining room. After several songs the North side got their tenors tuned up quite well on "My Wild Irish Rose," and thereafter they were unquestionably the better noise makers.

Members present had the pleasure of hearing a very interesting address by Mr. J. Charles Mottashed, Personnel Manager of the Hudson Motor Car Company, on the subject "Tool Engineers—Are They People?" The Bausch and Lomb Optical Company of Rochester, New York, showed a very interesting three reel motion picture of the manufacture of lenses and optical instruments. This picture is rated as the best industrial picture of 1933. Mr. Elmer G. Koch of the Bosch and Lomb Industrial Sales Division explained the picture and described the instruments shown on slides. Mr. Shippy operated the machine.

TOOL ENGINEERS—ARE THEY PEOPLE

By J. Charles Mottashed

I was afraid that the title of my speech had aroused some of your curiosity, probably some resentment, and probably a little fear that I might be able by some philosophical argument to demonstrate and prove to you that tool engineers were not people.

There is one thing I did notice this evening while I was here; that is, the amount of ready cash that was floating around. I determined you were not people, you were plutocrats; that the thing that has happened to personnel managers, did not happen to tool engineers, or that much money would not be free.

There may crop up in your minds a question as to what I am thinking about when I even dare to raise such a question—Are tool engineers people? Maybe in your mind you have said that man is either courageous or crazy. I wonder if you have heard the story of the teacher in psychology, who popped up and said to his students, "I am going to give you a problem in mental action. I am going to give you a problem and then I want the answer immediately; and then I want to get from you your mental processes. This is the problem:

"If it is 12 miles from Battery Park to Harlem River, and Brooklyn Bridge is 2 miles long, and coal is $7.50 per ton—how old am I? Quick! now, what is the answer?"

"You are 44 years old."

"That is exactly right. I want your mental processes. How did you arrive at the answer?"

"It was easy for me, sir; I have a brother at home who is only half crazy, and he is 22."

Some of my friends to the contrary notwithstanding, my opportunities of studying tool engineers have been quite extensive. I live in a house by the side of the road—my office is enclosed on three sides with glass and the fourth with blank wall, and I always sit with my back to the wall and look out into three phases and I observe all types and conditions of men, and among them have been many tool engineers.

I have observed them in periods of plenty and in periods of poverty, in periods of joy and sorrow, in anger and in peace, in selfishness and charity. I have observed them as conquerors and conquered. I have seen them master trials and tribulations and I have seen them beaten to subjection by adversity. I have seen them motivated by a great exhilarating force when on the verge of solving a perplexing problem. I have seen them throw up their hands in ignominy and defeat. I have seen them humble, unselfish, man-loving and God-fearing, the salt of the earth whose patience and faith can and has moved mountains. I have seen them rude and vulgar. I have seen them kind and considerate. I have seen them honest and dishonest.

I have beheld a scintillating brilliancy of mentality and I have beheld slow, painful mental processes combined with a doggedness and stamina that worked wonders in their chosen field of work.

I have seen Americans who could not speak English and foreign born who could speak English and several other tongues besides their mother tongue.

I have seen them soil dozens and dozens of table cloths while they sketched, for the edification of their listeners, the solution to their latest problem. A marble top table generates a gleam of joy in their eyes, for here is a matrix made to order, on which mistakess and changes can be made at will without an engineering change notice.

Four tool engineers around a table of this kind are only exceeded in their concentration by two chess players. It goes without saying that in argumentation and volubility the chess players are miles in the background.

In my observation of these men I have discovered that some of them think they can fool all the people all of the time; some are content to fool some of the people some of the time, and some are quite content to let the people fool themselves anytime, and whether it be among tool engineers or others, there is plenty of that being done.

Without desiring to precipitate a discussion, I may say that, in the opinion of your speaker, the latest piece of fooling is the "Buy British" or "Buy American" propaganda. There are enough causes of friction in the world today without interjecting another one.

This sort of propaganda breeds provincialism. Provincialism breeds race hatred. Race hatred breeds war, and God knows we do not want any more war.

Probably there are two things which threaten to destroy our civilization. When we speak of the greatest civilization, ours, we are intensely proud of it, not too proud. There are plenty of sore spots. Just enough to keep us humble with an objective in view. One of these spots is war, and war will destroy our civilization quicker than anything. War has been brought about, will continue to be brought about, and will be the outcome of provincialism by lying, public mistakes, and propaganda. Somebody fittingly said that diplomats get us out of muddles that we would not get into if we did not have diplomats.

These two big things threaten to destroy civilization—war and poverty. Probably poverty is not hitting us as keenly in this—I was going to say panic, but when I was a boy the only time we had a panic was during the Democratic administrations; when the Republicans were in power, it was a depression. Which brings to my mind that if you boys sang as you voted on this political question on Democrat versus Republican, then I can see why it took several days to unscramble the votes in Detroit.

Poverty, next to war, is the greatest waster we have. It submerges and deprives and prevents the fullest expression of men and women. Personally, I have an idea that poverty can be prevented, just as war can be prevented by the will of peace. Some day, we will be enlightened enough to have a Secretary for Peace, just as now we have a Secretary for War in the Capitol, and when we are at peace, the man who talks war will be a traitor, just as the man is a traitor who talks peace when we are at war.

This whole thing, the question of poverty and war, in my opinion, can be settled by application of the principle indicated by Jesus. There is a peculiar attitude—What is the law on this thing? How should I act? What should I do? Jesus said, "Whatsoever ye would that men should do unto you, do you in like manner unto them;" but He did not stop there. He went on, "For this is the *law*." Then, some smart aleck picked that out of there and said it was the Golden *Rule*. In your studies in school you learned that the *rule* is something that has an exception to it, while a *law* is without exceptions. The Great Master said *law* and we said *rule* so we could make exceptions.

This great fundamental law has never been tried by this great race. It would be a splendid thing if a great group of men could exercise the will to peace, and would put themselves to say to our lawmakers and diplomats, "This is the law; and it is a prime law; it is fundamental; it transcends any man-made law; it did not become the law when the Master said it; it always was the law; He was simply reiterating something that was for centuries on record."

But back to tool engineers. In all their activities and reactions, they behave in the crucible of life just like other people; they fall in love and think no one knows it; they get married and they want everybody to know it; they beget children and pass the cigars around for the first-born within a day; the second-born, the cigars are a little tardy in arriving; and by the time the fourth-born comes they have to wait until payday to treat the boys. They love home and wife and children like average people do, and behind her back they tell the same stories about their mother-in-laws that other people tell.

In the examination of many specimens of tool engineers, I have concluded that since, on the whole, that is, with few exceptions, they act just like human beings. In other words, they must be people.

I have had many peculiar experiences in interviewing men for

positions in the factory, and probably the must peculiar happened within the past three weeks. A husky gentleman came to me and asked, "Is there any chances, Mister, in getting a job in the production line?" I answered, "I'm sorry." "Do you need a janitor?" "I'm sorry." "Service department?" "I'm sorry." He started out, turned half way around, and said, "How about tool designing?"

THE MANUFACTURE OF OPTICAL INSTRUMENTS AND THEIR APPLICATION TO THE MACHINE INDUSTRY

By Elmer G. Koch

There is apparently a great deal of an idea, among mechanical engineers at least, that optics are something to conjure with, not to be understood by ordinary people. There I disagree with them. It is my purpose, first, to show this film that will give you a fairly good idea of the range of activities of our organization, as well as those of any other optical organization. It was rated the first industrial picture of 1931, and we take a great deal of pride in showing it.

Elmer G. Koch

In the film are just a few of the optical instruments. Many are well known, and have played no mean part in the advancement of society, while others are still in their very earliest stages of development, but some of these will play just as important a part as the compound microscope has played in the science of bacteriology.

The bacteriologist, who has done so much to make the world a better place to live in, is absolutely dependent upon the microscope. Only through the microscope was he able to extend his vision to a point where he was able to seek out and identify the organism responsible for many dreaded diseases. Only through the microscope have many of these organisms now been practically exterminated.

There are many other fields of endeavor today in which optics are of major importance. The Transit, Level, Theodolite, have made possible the wonderful accomplishments of the civil engineer. The metallurgist, through the use of optics has been of great service in the development of many of the materials that we have had access to in the past twenty years. That beautiful and indispensable product the present-day automobile, owes its very existence to the availability of these materials, which we now have and which were discovered with the assistance of the microscope.

Photographic lenses, and the projection lens, have made possible that tremendous and flourishing organization, the motion picture industry, which has contributed so largely to our pleasure and instruction.

The aeronautical photographic lens, range finders, sub-marine periscopes, field glasses, and many instruments were all valuable factors in our success in the late war, while spectacle lenses have been and are a veritable God-send to millions of us who for one reason or another are handicapped by poor eyesight. Spectacles have made it possible for us to have better vision, and in some cases have saved men's most gracious gift, sight.

I have called to your attention only a very few of the optical uses of lenses, and no doubt, any one of you can think of a great many more. My part tonight, as I understand it, is not to speak of optics in general, but only as they apply to mechanical engineering, and to tell you briefly the underlying principles on which the design of such instruments are based.

In the last analysis the definite purpose of any optical instrument is to direct and control light. Light has been defined as a form of energy transmitted by the ether, presumably the same ether which transmits our radio waves. Because it is energy, it is imponderable, and it travels at the enormous rate of 186,000 miles per second. It becomes apparent that to control this energy accurately enough to form images that will be true reproductions of the object we are examining, these optical elements must be made to a very high degree of precision. Suppose we want to examine a microscopic specimen under a magnification of 3000 times. This means that we want to form a picture of that object which covers an area nine times as large as that covered by the object itself. If we were going to look at a star, situated so far away that the light by which we view it tonight started on its journey 140 years ago, and that star passed out of existence 100 years ago, we would continue to see that star for the next 40 years. These are just a few of the things optical manufactureres have to deal with, and the price of their success is sustained accuracy to a degree limited only by human ingenuity.

You will readily see that the optical manufacturer has an urgent need for precision measuring devices in order to fabricate his product. For example, the surface accuracy of many photographic lenses is held to a few millionths of an inch. In some cases, suitable instruments were not on the market, and the optical manufacturer was compelled to design the necessary instruments for his purpose. Naturally, he chose the medium with which he is most familiar—light. And light because of its peculiar properties affords the means of making measurements which are entirely beyond the possibilities of ordinary equipment. You will recall that earlier we defined light as energy transmitted in waves. Further, light is without appreciable weight and is frictionless, and therefore without wear and tear. Accordingly, light lends itself extremely well to precision measurements.

Optics built into suitable mechanical devices were developed for the need of the optician, and have served him well. It also became apparent, due to the ever increasing demand for greater and still greater accuracy in many lines of manufacture, that these same instruments sometimes were of great assistance in other lines of endeavor. The mechanical engineer was slow in adapting for regular use such measuring devices, not because there was any doubt as to their accuracy, but rather because they had an idea that optical instruments were too delicate and too difficult to adjust, and not at all suitable for the bench. There is plenty of proof to the contrary. Surely, the civil engineer using his optical equipment in the field under all sorts of difficult conditions should be adequate to disprove any such idea. The same is true of the military engineer and his optical instruments as they are certainly required to withstand hard usage.

(*Continued on page 19*)

OUR ADVERTISERS;
Their Products and Specialties

AIR AND HYDRAULIC EQUIPMENT
Haberkorn and Wood, 2208 West Fort St.
Logansport Machine Co., 5928 Second Blvd.
Ross Operating Valve Co., 6488 Epworth Blvd.
Tomkins-Johnson Co., Jackson, Michigan.
Q-C Engineering Products, 1310 Maple St.

BALANCING EQUIPMENT
Commerce Pattern, Foundry, and Machine Co., 2211 Grand River Ave.

BLUE PRINTS AND REPRODUCTION PROCESSES
Charles Bruning Co., Inc., 218 West Congress St.

BORING EQUIPMENT
Detroit Boring Bar Co., 682 East Fort St.
Ex-Cell-O Aircraft and Tool Corporation, 1200 Oakman Blvd.
National Boring Tool Co., 1312 Mt. Elliott St.

BROACHING EQUIPMENT
Colonial Broach Co., 147 Jos. Campau St.
Continental Tool Works, 5835 Martin St.
National Broach and Machine Co., Shoemaker and St. Jean Sts.

BUSHINGS
Ex-Cell-O Aircraft and Tool Corporation, 1200 Oakman Blvd.
National Boring Tool Co., 1312 Mt. Elliott St.

CARBIDE TOOLS
Carboloy Co., Inc., 2483 East Grand Blvd.
Firth-Sterling Steel Co., 2800 East Grand Blvd.
Wesson Co., 1050 Mt. Elliott Ave.

CHRONOLOG
Graybar Electric Co., 55 West Canfield St.

COPPER AND NON-FERROUS CASTINGS
Commerce Pattern, Foundry, and Machine Co., 2211 Grand River Ave.

COUNTERBORES
Continental Tool Works, 5835 Martin St.
Eclipse Counterbore Co., 7410 St. Aubin Ave.

CUTTERS
Eclipse Counterbore Co., 7410 St. Aubin Ave.
John E. Livingstone Co., 2-246 General Motors Bldg.
Progressive Tool and Cutter Co., 2345 Wolcott St., Ferndale, Mich.
Wesson Co., 1050 Mt. Elliott Ave.

DIES, DIE SETS, AND DIE EQUIPMENT
Ace Tool and Die Co., 1310 Maple St.
Buell Die and Machine Co., 3535 Scotten Ave.
Commerce Pattern, Foundry, and Machine Co., 2211 Grand River Ave.
Danly Machine Specialties Inc., 1549 Temple Ave.
Gullberg Sales and Manufacturing Co., Inc., 840 Baltimore Ave.
Royal Oak Tool and Machinery Co., 621 East Fourth St., Royal Oak, Mich.
Surlock Punch Co., 38 Piquette Ave.

DRAFTING EQUIPMENT
McCauley and Madison Inc., 145 Eas tElizabeth St.

DRILL HEADS, MULTIPLE HEADS, AND DRILLING EQUIPMENT
Buhr Machine Tool Co., 2832 East Grand Blvd.
Haberkorn and Wood, 2208 West Fort St.
Indiana Drill Head Co., Richmond, Ind.
Krueger-Wayne Tool Co., 1400 Oakman Blvd.
F. Jos. Lamb Co., 6343 Wight St.
Pioneer Engineering and Manufacturing Co., 8316 Woodward Ave.
Snyder Tool and Engineering Co., 3400 East Lafayette Blvd.

EDUCATION
Lawrence Institute of Technology, 15100 Woodward Ave.

ELECTRIC MOTORS AND ELECTRICAL EQUIPMENT
Charles E. Wain Machinery Sales Co., 7800 Mack Ave.

ENGINEERING AND DESIGNING
Mechanical Engineering Service Corporation, 725-34 Insurance Exchange Bldg.
Michigan Tool Co., 7171 East Six Mile Road.
Pioneer Engineering and Manufacturing Co., 8316 Woodward Ave.

FLEXIBLE SHAFT MACHINES
Mall Tool Co., 8508 Gratiot Ave.
Manufacturers Sales Co., 2180 East Grand Blvd.

FLOATING HOLDERS
Royal Oak Tool and Machinery Co., 621 East Fourth St., Royal Oak, Mich.

FORM TOOLS
Progressive Tool and Cutter Co., 2345 Wolcott St., Ferndale, Mich.

GAGES
F. Jos. Lamb Co., 6343 Wight St.

GENERAL MACHINES AND TOOLS
Haberkorn & Wood, 2208 West Fort St.
Landis Tool Co., 5929 Second Blvd.
Motch and Merryweather Machine Co., 2842 West Grand Blvd.

GRINDING SPINDLES
Ex-Cell-O Aircraft and Tool Corporation, 1200 Oakman Blvd.

INDEX TABLES
F. Jos. Lamb Co., 6343 Wight St.

JIGS AND FIXTURES, STANDARD FIXTURE PARTS CLAMPS, ETC.
Ace Tool and Die Co., 1310 Maple St.
A. H. Pearson, 1310 Maple St.
Royal Oak Tool and Machinery Co., 621 East Fourth St., Royal Oak, Mich.
Siewek Tool Co., 2345 Wolcott St., Ferndale, Mich.
Swartz Tool Products Co., 6442 Epworth Blvd.

PRESSES
Slocum Engineering Co., 2842 West Grand Blvd.

PUMPS
Haberkorn and Wood, 2208 West Fort St.
Pioneer Engineering and Manufacturing Co., 8316 Woodward Ave.
Tomkins-Johnson Co., Detroit Representative, Byron B. Holt, Lo 2469.
Vickers Inc., 7752 Dubois St.

REAMERS
Kelly Reamer Co., Cadillac Square Bldg.
Whitman and Barnes Inc., 2108 West Fort St.

SHEET METAL EQUIPMENT
Slocum Engineering Co., 2842 West Grand Blvd.

SPECIAL MACHINERY, SPECIAL TOOLS, AND SPECIAL EQUIPMENT
Ace Tool and Die Co., 1310 Maple St.
Buell Die and Machine Co., 3535 Scotten Ave.
Commerce Pattern, Foundry, and Machine Co., 2211 Grand River Ave.
Davis Tool and Engineering Co., 6481 Epworth Blvd.
Pioneer Engineering and Manufacturing Co., 8316 Woodward Ave.

STEEL TREATING, CARBONIZING, ETC.
Anderson Steel Process, 1337 Maple St.

TAPPING EQUIPMENT
Buhr Machine Tool Co., 2832 East Grand Blvd.
Haberkorn & Wood, 2208 West Fort St.
Manufacturers Sales Co., 2180 East Grand Blvd.

Tool Engineering Bulletin No. 14

DRILLING TIME, IN MINUTES PER INCH, FOR GIVEN FEEDS AND SPEEDS

Feed Per	Speed - Surface Per Minute.										
Rev.	30	40	50	60	70	80	90	100	120	150	200
.002	4.35	3.27	2.62	2.17	1.86	1.63	1.46	1.31	1.09	.87	.65
.0025	3.50	2.61	2.09	1.75	1.49	1.30	1.16	1.04	.87	.70	.52
.003	2.90	2.13	1.74	1.45	1.24	1.08	.97	.87	.73	.58	.43
.0035	2.48	1.86	1.49	1.24	1.07	.93	.83	.74	.62	.50	.37
.004	2.18	1.63	1.31	1.09	.93	.81	.73	.65	.54	.44	.33
.0045	1.93	1.44	1.16	.97	.83	.72	.65	.58	.48	.39	.29
.005	1.74	1.29	1.04	.87	.75	.65	.58	.52	.43	.35	.26
.0055	1.58	1.17	.95	.79	.68	.59	.53	.48	.39	.32	.24
.006	1.45	1.08	.87	.73	.62	.54	.49	.44	.36	.29	.22
.0065	1.34	.99	.80	.67	.58	.50	.45	.40	.33	.27	.20
.007	1.24	.93	.75	.62	.54	.47	.42	.37	.31	.25	.19
.0075	1.16	.87	.70	.58	.50	.44	.39	.35	.29	.23	.18
.008	1.09	.81	.66	.54	.47	.41	.37	.33	.27	.22	.17
.0085	1.02	.77	.62	.51	.44	.38	.35	.31	.25	.21	.16
.009	.97	.72	.58	.48	.42	.36	.33	.29	.24	.20	.15
.0095	.93	.69	.55	.45	.39	.34	.31	.27	.23	.19	.14
.010	.87	.66	.52	.43	.37	.33	.29	.26	.22	.18	.13
.011	.79	.60	.48	.39	.34	.30	.27	.24	.20	.16	.12
.012	.73	.54	.44	.36	.31	.27	.25	.22	.18	.15	.11
.013	.67	.50	.40	.33	.29	.25	.23	.20	.17	.14	.10
.014	.62	.47	.37	.31	.27	.23	.21	.18	.16	.13	.09
.015	.58	.43	.35	.29	.25	.21	.19	.17	.15	.12	.085
.016	.54	.41	.33	.27	.23	.20	.18	.16	.14	.11	.080
.018	.48	.36	.29	.24	.21	.18	.16	.14	.12	.10	.075
.020	.44	.33	.26	.22	.19	.16	.14	.13	.11	.09	.065

NOTE:—For any diameter of drill, Multiply the figure in table by the diameter of the drill.

EXAMPLE:—Drill diameter=5/8 (.625), Speed=80 surf. feet per minute—Feed=.008 per revolution.

Drilling time per inch=.41 (from table) x .625=.256 minutes=15 seconds.

Courtesy of C. J. Oxford,
National Twist Drill & Tool Co.

Tool Engineering Bulletin No. 15

DRILLING OF WOOD

To those engaged in metal work, the drilling of wood seems like an easy task that does not present any problems. Yet there is a great variety of manufactured articles in which the successful drilling of wood plays a very important part. Many problems are encountered that are peculiar to this kind of material.

Some of the articles so affected are:—
Furniture, Automobile Bodies, Boats, Shoe Lasts, Brush Handles, Heels for Womens Shoes, Golf Club Heads, etc.

The type of drill most successful depends almost entirely on the kind of wood to be drilled, and on the diameter and depth of the holes.
Holes of comparatively large diameters are usually drilled with the spur type of drill, common to the woodworking industries. If the holes are small in diameter this type of drill becomes impractical, and a drill of the metal working type must be used.

Soft woods can usually be drilled with drills of the Bakelite type, having wide flutes, well polished; especially if the holes are fairly shallow.

Hard woods, on the other hand require drills of the single flute, double margin type. This latter kind of drill is particularly useful for drilling small diameter, deep holes in such woods as Maple and Oak. Again it is very important that the drill is well polished all over, so as to eject the chips freely. The above mentioned types of drills should be sharpened with ample lip clearance, and should have an included point angle of 60°.

Some of the softer woods when drilled have a tendency to splinter and tear along the grain where the drill enters and leaves the work. This condition can best be eliminated with the so-called "Spoon" drill. This is a single, straight fluted drill, having the center cut away. The proper sharpening of these drills is important. It can best be illustrated by a sample.

The main considerations for feeds and speeds are that the drill does not overheat. In soft wood and shallow holes the feeds and speeds can be high, while hard woods and deep holes call for slower speeds and less feed. In the latter case it is often necessary to relieve the drill one or more times in each hole.

Courtesy of C. J. Oxford,
National Twist Drill & Tool Co.

VICKERS

ARE NOW PREPARED TO FURNISH

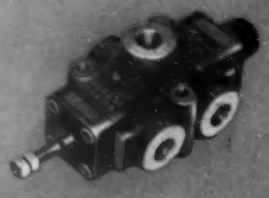
COMPLETE HYDRAULIC FEEDS AND CONTROLS

for all kinds of machine tools and other equipment

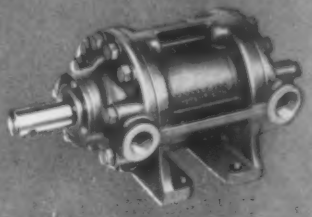
PRACTICALLY any required feeds and sequence of motions can now be secured by using various arrangements of *standard* Vickers pumps, valves, etc. This results in greater simplicity, more prompt delivery and lower costs.

Vickers engineers will be glad to work with you in the application of efficient and dependable hydraulic feeds and controls to your machine tools or other equipment.

VICKERS V-Type Rotary Pump for working pressures to 1000 lb. per sq. in.



A WIDE variety of Vickers 3-, 4-, 5- and 6-way Valves is available.



VICKERS V-Type 2-Stage Rotary Pump for working pressures to 2000 lb. per sq. in.

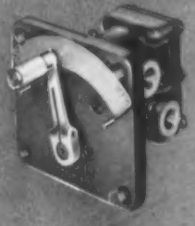
VICKERS Hydraulic Relief Valve (Balanced) for pressures to 2000 lb. per sq. in.

VICKERS Combination Pump and Valve Unit delivers large volume at low pressure and small volume at high pressure.

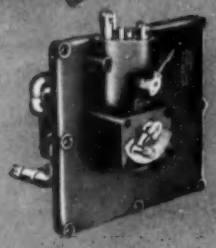
VICKERS Bypass Valve for two-pressure hydraulic systems.

VICKERS Piston-Type Pump for working pressures to 5000 lb. per sq. in.

VICKERS Automatic Hydraulic Feed for step-drilling deep holes.

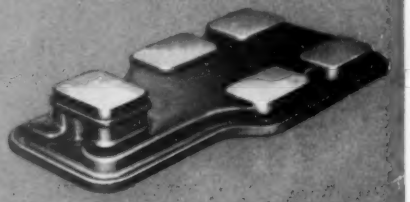


VICKERS C-202 Feed Control Valve for manually controlling the feed rate of hydraulic cylinders.



VICKERS Control Panel for any combination of automatic feeds and rapid traverses; includes everything except pump and cylinder.

VICKERS C-700 Feed Control Valve for automatically controlling combination of working strokes and rapid traverses.



VICKERS Pump and Motor Base.

VICKERS

INCORPORATED

7752 DUBOIS STREET

DETROIT, MICH.

WHAT IS TECHNOCRACY?

Condensed from the New Outlook (November, '32)

Wayne W. Parrish

During the World War industrial production, in this country, was speeded up to unprecedented heights in every line, toward a goal where all manpower could be released for war service. It was evident to a few engineers at that time that the type of high-powered equipment which they were installing would be far-reaching in its effect on our social structure. These engineers formed themselves into a group known as Technocracy, and began the task of making the most extensive analysis of our industrial and agricultural growth ever attempted.

The research work of the body has been directed by Howard Scott, engineer for the Muscle Shoals Project; and the original group of Technocracy, formed about 1920, included the late Charles P. Steinmetz, the electrical wizard; the late Thorstein Veblen, rebel economist; and Dr. Richard Tolman, of California Institute of Technology. At present the research is being carried on at Columbia University.

We must realize, Technocracy tells us, that we have reached the end of an era, that the fundamental cause of the depression is not political, it is technological. And that our present industrial system is incompetent to deal with it because the system is based on the assumption that the greater number of men at work the more wealth tends to increase.

This assumption appears ridiculous when it is realized that man hours per unit of product in certain industries have dropped in recent years to levels approaching zero! A photograph of a modern steel rolling mill in full operation will show a large plant without a human being on the floor. There are many examples of large plants that could be run continuously, were the demand sufficient, with only a few operators at the controls. And yet some of our demagogues are still talking about "returning to normalcy" and putting our unemployed back to work in factories.

What has happened is simply that we have moved at a terrific pace through the age of hand-operated machines into the age of technological mechanism. The machine of two decades ago was a hand-tool extension which aided man in doing his work. The technological mechanism today entirely displaces man—does all the work for him. Forty years ago it was an occasion for boasting when a new machine was installed to save human labor. Now there isn't even room for more than half our 14,000,000 unemployed if all our factories were running at 1929 production. Add to this the fact that a large proportion of our factory equipment is obsolete, ready to be scrapped for something more *efficient!* We have the spectacle of widespread efforts being made to put men to work where there isn't work to be done and where machines are infinitely more efficient. Has no one thought of letting the machines do man's work?

If you want to know how far we have gone technologically, bear in mind that 100 men in modern brick plants working steadily could produce all the bricks the country needs. In pig iron production, one man working one hour can do what it took him 650 hours to accomplish 50 years ago. In incandescent lamp manufacture one man now does in one hour as much as it took him 9000 hours to do only so short a time past as 1914. A Milwaukee plant with its daily output capacity of 10,000 automobile chassis frames and 34 miles of pipe line requires a total of 208 men in the plant. One man riding in the control cab can do all the loading of freight cars which are shunted up to the siding of this factory. And most of this tremendous increase in the efficiency of machinery has come *within the last 30 years.*

Many of our leaders are talking about developing "new industries" that will absorb the unemployed. Technology's reply is to take an example such as the proposed factory-fabricated housing project which has been reported about the nation. By means of factory-made houses, it was planned to open up a new market through the elimination of slums and the modernization of rural houses. The American Rolling Mills, the A. O. Smith Corporation and General Houses, Inc., have erected completely furnished units in several large cities. The argument is that by selling these houses on the installment plan, a huge market would be created that would push the nation out of the depression.

Unfortunately, the idealists back of this proposal did not take into account the technological aspect, for these houses, completely equipped, can be produced on a continuous straight line process, with an output of from 30 to 50 miles of 8 by 12-foot sections a day with less than 200 operators to the plant. This would fail not only to absorb the unemployed, but it would tend toward the total elimination of masons, bricklayers, painters, plumbers, electricians and the like, and further disrupt the entire building trade!

Aside from the purely technological aspect, there is another vital consideration in our system. This is the monetary debt. The total debt of this country—bonds, mortgagess, bank loans, and all other interest-bearing amortized securities, totals approximately $218,000,000,000.

The return on investment in industry is constantly being reinvested on the assumption that the debts can be increased to infinity since production is restricted only to the limitless desires of individuals for products contributing to their comforts. As a result, we have been increasing our debt structure with no regard for the future. It has been common to issue bonds on equipment that was either obsolete or soon became so. We are still paying for equipment that was removed because of obsolescence years ago. Some of our railroad bonds will not mature for decades and yet 99% of the locomotives on our railroads are obsolete. We have "issued a debt claim on posterity" on a false theme of expansion to infinity and now the fixed charges of our debt have risen to half the national income! Obviously, from the financial standpoint, the circus cannot keep up indefinitely, and there are indications that the limit is about reached.

As long as we were expanding industrially, our system could tolerate haphazard control. But the turn has come. Technology has caught up with expansion. The only reason why our day of reckoning has not come earlier is because industry has kept itself moving by selling cheap goods, thus necessitating replacements. We are paying for our price system by buying "new models," the "latest designs" and colors. If industry, with what it knows today, should sell the best that it could produce, most factories would have to shut down for a period of years.

Technocracy tells us that with what is known now about the application of technology, the adult population of this nation would have to work only four hours a day for four days a week to supply us with all our material needs. The replacement business of industry cannot for long exist under our present system, for new equipment, new inventions, are constantly being placed in use. In short, there is no way out without an entire revision of standards of valuation.

Note:—Next month another viewpoint of Technocracy will be presented.

The Tool Engineer in Sweden

By HARRY GORDEN*

When in the latter part of July 1931 I received a telegraphic offer to go to Sweden as a consultant on American methods of automobile production "for six months if we deem necessary," I felt pretty good, for I reasoned that by the time I got back home to Detroit again this re-adjusment period (I like that word a great deal better than that Democratic "panic") would be well on the way to our usual prosperity. However, being a tool engineer my calculations were away ahead of the times.

Anyway, I left New York in the middle of August with the temperature about blood heat; when we got to Halifax it had dropped to 65°, and when I arrived in Götenborg, Sweden, a week later, it was 50° and it never got any higher that year.

My first experience was with the custom boys who found a couple of cartons of "Luckies" in my baggage that I intended to smoke while over there, and they told me I had to pay $2.70 for each carton in duty—I paid, and found out later that if I wanted to buy them over there they had lots to sell at 54c per package, and then people talk about the high tariffs in the U. S. A.

After having wired my arrival to my employers, I got on the train. When I arrived at the station there was a 1930 Hupmobile 4-door sedan waiting for me and after packing my trunk and various other belongings in the back seat I got up in front with the driver. We drove for 18 miles through very picturesque country on hard gravel roads about 19 feet wide with a dandy 6 foot ditch on each side, and when we met anybody we should have had greased hub caps. The chauffeur, however, was an excellent driver. We surely could use drivers like him in Detroit, and we arrived safely at our destination in Bofors in about 45 minutes, or an average of 24 miles an hour, and considering how crooked that road was I think it was remarkable time. I have often wondered since I got back if the fellow who layed out those roads had our Jig Saw puzzles in mind while doing it.

Mr. Harry Gorden

This is where I lived in Bofors for seven months.

On arrival I was assigned a very pleasant room in a private home owned by the company, immaculately clean with modern furniture, hot and cold water, hot water heat, a fully equipped bath room, electric lights; as a matter of fact, everything that anybody could ask for in the way of comfort. The house was built on a knoll, and looking out of my window a bunch of birch trees, a small stream winding its way down to a lake about three quarters of a mile wide and two miles long.

I want to tell you something about this place before I go any further. The history of Bofors goes back to 1646, or about 86 years before George Washington was born, when the first water power forges were set up there. They have plenty of water power there, and the forest-clad surroundings are vast. When we talk about Sweden we must think of a country about the size, or a trifle larger than the state of California, or 173,000 sq. miles, and about the same population per square mile (35.3). The capital of Sweden, Stockholm, is on about the same latitude as Skagway, Alaska, or 59° 20'. They have water power of over 4 billion kilo-watt hours, or over 5 billion Turbine H. P., but to go back to the history of Bofors there came a period towards the close of the 19th century when it witnessed a very important expansion under the leadership of that world famous philanthropist and inventer of dynamite, Dr. Alfred Nobel, to whom a great deal of credit is due for to the present size and reputation of this company. Bofors ranks just as high as other purely Swedish trade marks, such as, AGA, ELEKTROLUX, DELAVA, S. K. F., SANDVIKEN, etc., etc.

The Bofors Company employs about 2400 men and manufactures, besides artillery and ordinance material, all the steel, drop forgings, frames, and a great number of parts for the Swedish motor car "VOLVO," such as the crank shaft, connecting rods, rear axle housing, and cam shafts. In this connection, I might mention that since its recent enlargement and modernization, the Bofors drop forging workshops occupies the premier position in Scandinavia as regards both size and output.

Well, anyway, when I got down to the administrative building I found a four story office, ultra modern in every respect, with every facility and equipment that anybody could ask for. The managing director, I found out, had gone on a hunting trip in the northern part of Sweden, and wouldn't be back for a couple of weeks, but he had left instructions with the chief engineer that I should be let loose in that plant for two or three weeks so as to fully acquaint myself with their organization, shops, offices, and methods, and after that I should see what I could do. When I started to look around that plant I got the surprise of my life.

The Administrative Bldg. at Bofors.

The first couple of days I spent in the engineering office and the tool design. The engineering office has about 50 graduates of the Royal Technical High School of Stockholm, which compares very favorable with the M. I. T. of Boston. They are especially trained for this kind of work, backed up with an engineering reference library in connection where you may find anything pertaining to engineering in the English, German and

*Member A.S.T.E.

French languages. Any one of those boys read and speak German fluently, and can read and understand English or French, which is part of their university training.

The Tool Design office is housed in a smaller adjacent building, and has about 12 tool designers that work there the year around. They don't employ a lot of men for a few weeks and then let most of them go which is so prevalent in the automotive industry. Everybody seems to be happy and contented. The office hours are 8:30 to 5 o'clock with an hour for lunch, and on Saturday, 8:30 to 1:30, with a 15 minute rest period, when you can go downstairs in a quaint little lunch room and drink your coffee and Swedish pastry while smoking your cigarette. Most of the boys in the tool design have spent anywhere from 6 months to 4 years in the U. S. A. practising, and speak fairly good English. The salary of a tool designer averages 350 kronor or about $95.00 per month. To us over here that does not seem so much, but when you consider that you can buy yourself a good suit of clothes made to measure with two pairs of pants for 125 kronor ($33.00), or a "hand me down" for half that price. When a single man can rent a room with board for $30.00 per month, or a married man can rent a modern 5 room house for $13.50 a month, the proposition isn't half bad, with no lay-offs, a two weeks vacation with pay, and at least twice as many holidays as we have in this country. I consider it very reasonable indeed.

In the files of the tool design office you will find a catalog and complete specifications of every machine tool made in the States, Germany and England, besides their own machine tool industry in Sweden, which is no small item, considering. They make a centerless grinder in Sweden which compares very favorably with our Cincinnati. They make an excellent, both vertical and horizontal, mill; and their lathes are well known over continental Europe. The iron and metal manufacturers in Sweden employed almost 19,000 men in 1924.

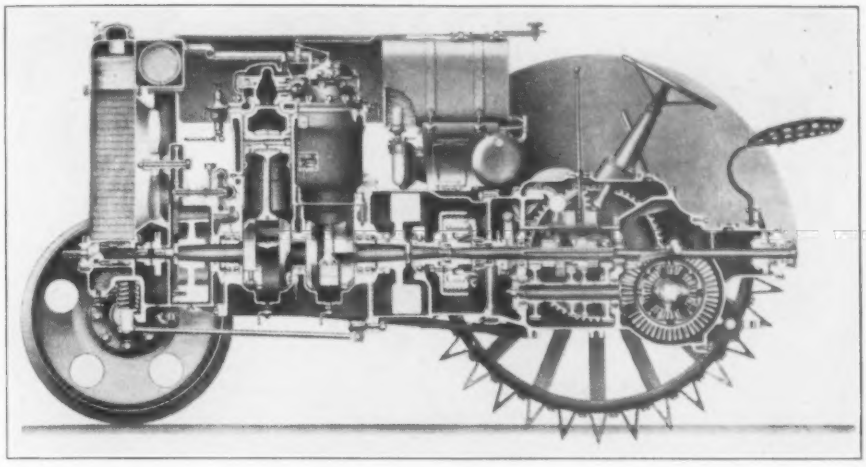
My next step to get acclimated was to get down in the machine shops, and they have plenty of them. I started where they machine the automobile and tractor parts. I almost forgot to tell that they also manufacture a tracter powered with a two cylinder, vertical semi-diesel engine, developing 40 brake horse power at 650 r. p. m., and a draw bar pull of 25 horse power, bore 7½" and stroke 7 5/16", and they claim a consumption of fuel (crude oil) of about ½ lb. per brake horse power an hour.

The first thing that struck my eye was a 20" and a 34" Wickes Bros. crank-shaft lathe; a "Böhringer" (German make) crank-shaft lathe even larger than the largest Wickes Bros.; a 48" Starr (Swiss make), three spindle horizontal mills something similar to a large Cincinnati Hydromatic; a sixteen spindle Moline Multiple Drill press; and a couple of Heinemann (German) hydraulic feed, multiple tool, low swing lathes of the latest type. All this in addition to the usual array of lathes, milling machines, and drill presses and what-nots in a machine shop. There were also a couple of Herbert (English) No. 5 turret lathes for the turning of drop forged fly wheels, and as the schedule for 1932 called for 5,000 crank-shafts, the crank-shaft lathes would be running about 20% of the time. And those lathes cost in the neighborhood of $10,000.00 a piece delivered at Bofors. In the inspection department they had besides the usual Swedish Blocks an array of Zeiss optical measuring instruments equaling any assortment I have seen in automobile shops in Michigan, and I have seen a lot of them. This shop had about 150 men in it and they all seemed to be busily engaged in their various tasks of endeavor. Still there was something lacking, something different, something that you could not see at first glance, and still you knew the difference was there. A time study revealed the fault, if you can call it a fault. It was not the tempo, although it must be admitted they have not that feverish atmosphere so characteristic of the American automobile shop; it was not the supervision of the Work. The difference was mostly attributed to the machining quality of the material itself.

One of the drafting rooms at Bofors.

The Swedish steel, as everyone knows, is made from a charcoal iron of the highest grade and contains hardly a trace of phosphor and sulphur. In spite of having the identical physical and chemical analysis, with the exception of impurities, as our American steel, it does not machine as readily. I spent a considerable amount of time in their laboratory with the ablest of metallurgists found anywhere, and as far as I know this problem is not fully solved as yet. I have written reams of papers on investigations as to cutting speeds for Swedish material, and the Royal Swedish Institute for scientific-industrial research has now published a book on this vital subject.

The Swedish machinist and toolmaker of today is a highly trained mechanic with a four year compulsory apprentice training before he can become a journey-man, and is paid an average



Sectional view of Bofors tractor.

hourly rate of about 35 cents per hour at the steel mills and the small cities, and as high as 54 cents per hour in the larger cities where living expenses, especially rent, are a great deal higher.

Space does not permit me to go into details regarding all the work that was done and the many interesting things I saw during my stay in Europe. I was asked by the editors to write an article on Russia and its problems, but after reading Will Durant's article in the Saturday Evening Post of January 21, 1933, where he so ably covers the life span from the cradle to the grave, I can't see where there could be anything more to be said by me.

The Swedish workmen, as well as their engineers, don't know how well they are off, everything taken into consideration. I could easily write as much again on the social life of these people, because I spent most of my spare time studying just this particular phase of their life, and I can assure you that it is equal to or better than that of any other European nation.

I sailed for the States on the 10th of March, 1932, and had an uneventful trans-Atlantic trip with one exception. While in mid-ocean there came a message through the ether that Ivar Kreuger had shot himself in Paris, and with due respect to his family, I don't think that was such a bad thing after all.

EDITORS NOTE:

Mr. Harry Gorden was born and partially educated in Sweden and came to this country 31 years ago, most of which time has been spent in the automotive industry, starting as a die maker in the old Cadillac plant in 1906. The machine tool men of Detroit remember him quite well while he was consultant for the Cheliabinsk Tractor Co., (a Russian commission) in 1930-1931, and we hope to hear from him again telling us about some of his many experiences as a tool engineer both here and abroad.

(Continued from page 12)

Some optical devices have been introduced in the shop, and as a result many measurements can be made which have heretofore been impossible with the apparatus available to the mechanic. There are really four groups of optical instruments which are now finding gradual favor in the machine shop and other manufacturing processes. They are:

Interference Apparatus — Optical Scale Reading Devices
Optical Lever Apparatus — Imaging Systems

One of the properties of light that has early been recognized as being of great value is the constancy of its wave length for a given color. Another valuable property is that of interference. From a combination of these two properties results the fact that each band in a group of Newton rings represents a very definite minute separation between the surfaces forming the rings. This distance is a function of the wave length of the light used, and is an extremely accurate measurement of small distances. With the careful manipulation of optical flats under proper temperature control, measurements may be made accurately to the order of a few millionths of an inch.

He apparently wants to become the wealthiest man in the cemetery.

"You musn't believe all the stories you hear about me," said the man from Hollywood. "Most of them are just old wives' tales." — Passing Show.

An Appalachian guide, discussing his wife, remarked: She has a very even temper—she is always mad.

Co-education was once a race for supremacy between the sexes, but now it's neck and neck.

One answer to the problem of how to treat reporters is, "Treat them frequently." — F. H. Brennan in Vanity Fair.

Our position (in San Francisco) is that of the Virginia gentleman of long ago who warned his son: "Never ask a man from what state he comes. If he's a Virginian, you'll know it. If he isn't you'll shame him." — Kathleen Norris in Cosmopolitan.

Even the best of friends must park. — Life.

For his book "The Last Word," Homer Croy asked living celebrities to write their own epitaphs. One of the neatest came from Dorothy Parker: "Excuse my dust." Walter Winchell, gossip columnist, wrote: "Here lies Walter Winchell in the dirt he loved so well."

A wise old trainer, asked for some advice on winning races, said, "Well, sir, the thing to do is to get out in front at the start and improve your position from there on." — Judge.

Motorist, leaving car at garage: "Now I don't want you to jack up the radiator cap and put a new car under it."